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ECONOMIC JUSTIFICATION OF THE NEED TO DRILL WELLS WITH SEPARATE OPERATION OF SEVERAL HORIZONS AT THE SAME TIME

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Abstract: the article provides a complete study of the possibility of simultaneous development of several formations by one object only with the same physical and chemical properties of oil in the combined formations, if the inflow of oil and gas is sufficient from each formation at an acceptable bottom-hole pressure in the well, with close values of reservoir pressure in the combined formations, excluding oil flows between the layers, and close values waterlogged formations. It also describes the field experience of operating several layers with one well by the method of dual completion (DC), indicating its high efficiency. On average, capital investments and operating costs are reduced by 30% in comparison with the costs of drilling and operating fields with independent grids for each formation. The DC method is cost-effective and makes it possible to seal the grid of wells (producing and injection) without additional drilling footage. 0the integration of productive formations into operational facilities leads to a significant reduction in the volume and timing of drilling of the field, saving material resources for the development of fields. At the same time, during joint operation, as a rule, the conditions for the development of each individual reservoir deteriorate, it becomes difficult to control and regulate the operation process. In these cases, the method of dual completion is used, through which a differentiated effect is carried out on the formations developed jointly by one well grid. Dual completion is a means that, with economical joint operation, ensures optimal conditions for the production of oil reserves of each reservoir and thereby increases the economic efficiency of their development. Technological efficiency is understood as an increase in the rate of production of reserves and the oil recovery coefficient of each formation of a multi-layer facility by regulating the operation

processes. At the same time, the movement of water-oil and gas-oil contacts and the coverage of the reservoir by displacement in power is regulated. Dual completion in domestic practice and abroad is carried out by equipping wells with special equipment for separation of layers or using wells of special designs for these purposes.

Key words: packer, fountain-gas lift, income, depreciation, oil recovery, revenue, payback.

1. Introductions

Most oil and gas fields are multi-layered. At the same time, several productive layers are located floor by floor one above the other. The development of such deposits by independent grids of wells drilled for each individual reservoir, from the point of view of rational development, is the most preferable. However, the experience of oil field development shows that more than half of all capital investments are spent on drilling wells. Therefore, the development of multi-layer deposits by independent grids of wells for each formation requires huge capital expenditures and is not always economically and technologically justified.

2. Aim

In this regard, when developing multi-layer deposits, several productive layers are often combined into one operational object, which makes it possible to shorten the time of field development, reduce capital investments for drilling wells and field development, etc. At the same time, simultaneous development of several formations by one object is possible only with the same physical and chemical properties of oils in the combined formations, if the inflow of oil and gas is sufficient from each formation at an acceptable downhole pressure in the well, with close values of reservoir pressure in the combined formations, excluding oil flows between the layers, and close values of reservoir waterlogging. [1, 2, 5] If the above conditions are not met, then multidimensional deposits are developed by the DC method with one well. Depending on the specific geological and technical conditions of the development of deposits, technical and operational characteristics of wells, one of the currently available DC schemes is used. Mandatory requirements for all DC schemes are the possibility of separate development and commissioning of each reservoir, measurement of oil flow rates of each reservoir separately, as well as separate measurement of each reservoir for water content, gas content and examination of each reservoir for oil and gas inflow. [3, 4, 8, 9]

3. Materials and methods

When deciding on the use of the DC method, the degree of depletion of reserves, the proximity of the oil-bearing contour to wells, the presence of resins and paraffin in the extracted oils, the thickness of the productive layers and the non-permeable

layers separating them, the condition of the production well column, etc. are taken into account.

In case of DC of two horizons, the layers are separated from each other by a packer. One or two rows of pumping and compressor pipes descend into the well, which are lowered in parallel or concentrically. With simultaneous and separate operation of two or more horizons, reservoir development can be carried out according to the following schemes: fountain-fountain; fountain-pump; fountain-gas lift; fountain-injection; gas lift-pump; gas lift-gas lift, gas lift-injection; pump-pump; pump-injection; pump-injection. The field experience of operating two layers with one well by the DC method indicates its high efficiency. On average, capital investments and operating costs are reduced by 30% in comparison with the costs of drilling and operating fields with independent grids for each formation. The DC method makes it possible to seal the grid of wells (producing and injection) without additional drilling footage. [6, 7, 10].

4. Results and discussion

The positive effect of the use of DC technology is expressed in the reduction of capital investments for the construction of wells for each of the operational facilities, in the reduction of operating costs and the term of development of a multi-layer field, in the increase in hydrocarbon production and the term of final oil recovery with cost-effective operation of wells. In addition, the use of this technology contributes to an increase in the utilization rate of downhole equipment and the reliability of the downhole installation. Based on the accumulated experience and taking into account the positive effect, the technology of implementing DC is recommended for the necessary further application in the western and eastern parts of the oil and gas fields of Turkmenistan.

The traditional scheme of using exploitation in the development of hydrocarbon deposits includes:

- The use of individual wells for operation on each formation in a multi-layer hydrocarbon deposit;
- Drilling of an additional fund of wells for the organization of a project system for the extraction of hydrocarbon raw materials from several productive horizons.

The DC system of several productive horizons allows:

- The use of one well for the simultaneous operation of several productive horizons in a multi-layer hydrocarbon deposit;
- Reduction of the number of production wells while ensuring planned oil and gas production indicators;
- Reduction of unit costs during well operation;
- Reducing the number of drilling wells, while ensuring the planned volumes of oil and gas production.

DC systems from several productive horizons can reduce the cost of hydrocarbon production by:

- Reducing the costs of operation and maintenance of production wells;

- Reduction of capital investments in the construction of reservoirs, oil collectors and reduction of costs during their operation and repair;
- Reduction of capital investments for drilling production wells [12,13,14].

5. Conclusions

The purpose of the calculations was to assess the economic efficiency of improving the efficiency of development due to the DC at the North Goturdepe field, where 4 wells were investigated №№ 147, 37, 156, 200, meeting the criterion of achieving the maximum economic effect from the possible complete extraction of oil reserves from the reservoirs while complying with the requirements of ecology and environmental protection.

The economic efficiency of the additionally extracted oil is evaluated by a system of calculated indicators acting as an economic criterion.

The following evaluation indicators are used to assess economic efficiency:
- operating costs for additional oil production;
- revenue from the sale of additionally extracted oil;
- profit from the sale of additionally extracted oil.

Profit from sales is the total income of the enterprise, reduced by the amount of operating costs, including depreciation charges and the total amount of taxes allocated to budgetary and extra-budgetary funds.

When evaluating methods to increase the intensification of oil production, operating costs were calculated on the basis of the primary reporting data of the oil and gas production company on the items of the calculation of the cost of oil production on the date under consideration [11,15].

Operating costs are calculated in accordance with specific current costs and volumetric technological indicators in the context of the following items:
- energy costs of liquid extraction;
- collection and transportation of oil;
- technological preparation of oil;
- repair costs;
- depreciation charges, etc.

Energy costs are calculated depending on the volume of mechanized liquid extraction. When calculating these costs, they proceed from the average cost of electricity and its specific consumption.

The costs of collecting, transporting oil and gas, and technological preparation of oil are calculated depending on the volume of the extracted liquid, excluding depreciation charges [16].

Evaluation of methods to increase the intensification of oil production should be carried out in accordance with the tax system established by law. The following is a list of taxes deducted to the budgetary and extra-budgetary funds of the country, and the order of their calculation is shown:
- value added tax is calculated at the rate of 15% of the oil price;

- income tax is calculated in the amount of 20% of the balance sheet profit remaining from revenue after compensation of operating costs and payment of all taxes.

Taxes and payments accounted for as part of operating costs:

- the mineral extraction tax is calculated at the tax rate specified in the Tax Code.

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